

CLAIMS

We claim:

1. A functionalized polymer comprising:
 - a) an elastomer,
 - b) a terminal functional group comprising at least one heteroatom, and
 - c) intermediate said elastomer and said functional group, a unit comprising a terminal moiety which, in its anionic form, is less basic than a secondary amino radical ion.
2. The functionalized polymer of claim 1 wherein said terminal functional group comprising said at least one heteroatom is a radical of a compound comprising a primary or secondary amine group.
3. The functionalized polymer of claim 1 wherein said intermediate unit comprises the ring-opened residue of a cyclic structure that comprises a heteroatom.
4. A method of making a functionalized polymer, comprising:
 - a) providing a polymer that comprises at a living end a unit comprising a terminal moiety which, in its anionic form, is less basic than a secondary amino radical ion; and
 - b) reacting said polymer with a compound comprising at least one heteroatom, thereby providing said functionalized polymer.
5. The method of claim 4 wherein said compound comprising at least one heteroatom comprises a primary or secondary amine group.
6. The method of claim 4 wherein said unit at the living end of said polymer comprises the radical of a cyclic structure that comprises a heteroatom.
7. A composition comprising at least one reinforcing filler and a functionalized polymer of the general formula $E-A-G_t$ wherein E is an elastomer, G_t is a terminal functional group comprising at least one heteroatom, and A is a unit comprising a terminal moiety which, in its anionic form, is less basic than a secondary amino radical ion.
8. The composition of claim 7 wherein G_t is a primary or secondary amine radical.

9. The composition of claim 7 wherein A comprises the ring-opened residue of a cyclic structure that comprises a heteroatom.
10. A method of making a vulcanizate comprising blending at least one reinforcing filler and a functionalized polymer of the general formula E-A-G_t where E is an elastomer, G_t is a terminal functional group comprising at least one heteroatom, and A is a unit comprising a terminal moiety which, in its anionic form, is less basic than a secondary amino radical ion.
11. The method of claim 10 wherein said at least one reinforcing filler comprises at least one of carbon black and silica.
12. The method of claim 10 wherein A from said functionalized polymer comprises the ring-opened residue of a cyclic structure that comprises a heteroatom.
13. A vulcanizate comprising at least one reinforcing filler and a functionalized polymer of the general formula E-A-G_t where E is an elastomer, G_t is a terminal functional group comprising at least one heteroatom, and A is a unit comprising a terminal moiety which, in its anionic form, is less basic than a secondary amino radical ion.
14. The vulcanizate of claim 13 wherein said at least one reinforcing filler comprises at least one of carbon black and silica.
15. The vulcanizate of claim 13 further comprising at least one of an additive and a processing aid.
16. A tire comprising a tread made from the vulcanizate of claim 15.
17. A method of making an amine-functionalized polymer, comprising:
 - a) in a reaction medium, reacting a living polymer with a cyclic compound comprising at least one heteroatom so as to provide an intermediate functionalized living polymer comprising an anionic charge on said heteroatom with the proviso that the resulting anion is less basic than a secondary amino radical ion;
 - b) introducing into said reaction medium an amine comprising an active hydrogen atom attached to the amino nitrogen atom of said amine and allowing said amine to chemically bond to said intermediate functionalized living polymer, thereby providing a said amine-functionalized polymer.

18. The method of claim 17 wherein said cyclic compound is a polysiloxane.
19. The method of claim 18 wherein said polysiloxane is hexamethylcyclotrisiloxane or octamethylcyclotetrasiloxane.
20. The method of claim 17 wherein said cyclic compound comprising at least one heteroatom is an epoxide or episulfide.